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# Face part visual acuity chart

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## Abstract

The Face Part Visual Acuity Chart is a new visual acuity test designed for children from one to four years of age. By using familiar facial features as test characters, difficulties for this young age group, such as letter recognition, verbalization, or directional hand movements will be reduced or eliminated. Recognition of symbols will be compared to other acuity test cards.



## Degree Type

Thesis

## Degree Name

Master of Science in Vision Science

## Committee Chair

Paul Kohl

## Subject Categories

Optometry

# FACE PART VISUAL ACUITY CHART

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This project was done in fulfillment of the Doctor of Optometry degree at Pacific University College of Optometry Forest Grove, Oregon.

Date of completion: May 1987

Christene F. Gross Chris Gross

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## ABSTRACT

The Face Part Visual Acuity Chart is a new visual acuity test designed for children from one to four years of age. By using familiar facial features as test characters, difficulties for this young age group, such as letter recognition, verbalization, or directional hand movements will be reduced or eliminated. Recognition of symbols will be compared to other acuity test cards.

## ACKNOWLEDGEMENTS

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# Author's Biography

Christene F. Gross

Universities attended, degrees awarded:

Oregon State University; Corvallis, Or.

University of Pavia; Pavia, Italy.

Portland State University; Portland, Or. - Bachelor of Arts, Fine Art.

Pacific University Forest Grove, Or. - Doctor of Optometry.

Future plans include practice in the Portland metropolitan area.

Chris Gross

## INTRODUCTION

Assessment of visual acuity is an important part of any vision testing battery. Accurate testing of the acuity of very young children has been a challenge, especially for the pre-school child. Most often,for this age group, picture cards are used, or the tumbling E chart, if the child is mature enough to indicate directions with the hands. After the child is of school age, a standard Snellen letter chart can be used. This and other letter and picture charts which have been developed and normed for this older age group give good results.[1-12]

Infants between 0 and three years of age have been tested with preferential looking devices, but at near distances only. 13,14,15,16.

Children from one to four years of age may be either uninterested in preferential looking devices or unable to use a letter chart, Tumbling E chart, or picture chart. Members of this age group may begin to suffer serious vision anomalies which can hinder normal binocular development and efficient use of the eyes.

The most frequent ages for the onset of non-traumatic strabismus are between two and six years. [18] Amblyopia, often associated with strabismus, is

measured with acuity testing procedures, and, for this age group, reliable measurements are difficult. Tests that have been used include: the Danish Pictorial Sight Test, Modified Pictograph Method, AllenCards (one of the most popular), American Optical Kindergarten Vision Test, Kinderbilde Tests, Lighthouse Cards (also often used), Bealle Collins Pictures, Clement Clarke Pictures, Rosanno Pictures, American Optical Picture Slide (often used for distance testing), Animal test, Efron Visual Acuity Test, Picture Cards, the Baily-Hall Cereal Test, and Sjogrens Directional Hands Chart. [17]

Testability of 2 and 3 year old children varies according to the test used. A survey of the literatureindicatestestability to be as low as 25% in 3 year olds if the test used requires a directional response, matching responses, or naming response for letters.[22,23,24]. Picture naming,though,has shown testability as high as 85%. For 2 year olds, best testability was found with picture naming. [17]

While picture charts may show the best testability, most have limitations. Many have not been normed for any age group. [17] Only two, Allen Cards and Rosanno Picture Cards have been normed for age two. None have been normed below this age, however, the Bailey-Hall Cereal Test is designed for children 18 months to 36 months, with normative data collection in progress. Two year olds, tested in 1972 by Woodruff, [19] showed only 15%

could identify symbols to at least 20/30 acuity. Rosanno Pictures, normed for a group 2 1/2 to 4 1/2 years,but not for individual ages, showed 97% could identify 5 out of 6 pictures by four 1/2 years of age.

Many tests use pictures not easily identfied by 1 to 4 year old children. Often a period of conditioning is required to acquaint children with the optotypes used for acuity testing, making the process inefficient and lengthy. Many children in this age group may also not be able to, or unwilling to verbalize a response. This limitation makes many presently available picture tests difficult to use, especially at distance. For children of different language backgrounds, tests requiring verbalization would be difficult without an interpreter present. A functionally disabled child, unable to speak, or with fine motor difficulties, as required for the Tumbling E, may also not be able to respond. Even with prior conditioning a child of 18 months to 2 years may not reliably respond to presently available pictures.

This project was designed in an attempt to construct a new acuity test with optotypes which will minimize many of the limitations of other picture acuity charts. The symbols used will be opototypes of the eye, ear, nose and mouth, symbols which children see from their earliest days of life; thus providing easy recognition and, hopefully, little if any conditioning.

Working with this type of test can be of great value when working with young children who may be pre-verbal or reluctant to speak to a stranger. Allowing a pointing response to their own features for the optotype presented, simulates a game which many parents teach their children as early as one year of age. Children with speech defects may also be successfully tested with this procedure. Children with other physical handicaps may also be successfully tested as long as they can negotiate their hand to the appropriate facial feature. Non-english speaking children may be instructed with pantomimed directions and tested successfully.

This chart could also be used with non-english speaking adults and non-verbal adults.

# METHODS AND MATERIALS

## SUBJECTS

This research project is designed to be an investigational study to develop a new visual acuity testing chart for children aged 18 months to 4 years.

## TEST ADMINISTRATION

Operant conditioning will be used to teach the children to verbalize the name of the facial feature or to point to it on themselves. The advantages of this method would be the familiarity for even very young children with the features represented by the optotypes. Children are often taught to identify these features well before the age of two.
The protocol for administration of this test, calls for a matching response. This appears to be the most appropriate for this age. [10] The near card will be shown to each child at a distance of 10-12 inches. The tester points to the symbol on the first line and says, What's this?" or "Where is this?", "Can you point to this on your self?" The tester then progresses to lower lines until the child misses half a line or cannot identify at least half a line. The children are then shown the near chart Allen cards and Lighthouse cards. In each case, the child will be instructed in the names of the symbols. They are then to be

tested in the same manner as the Face Part chart. The acuity results of these tests will then be compared.

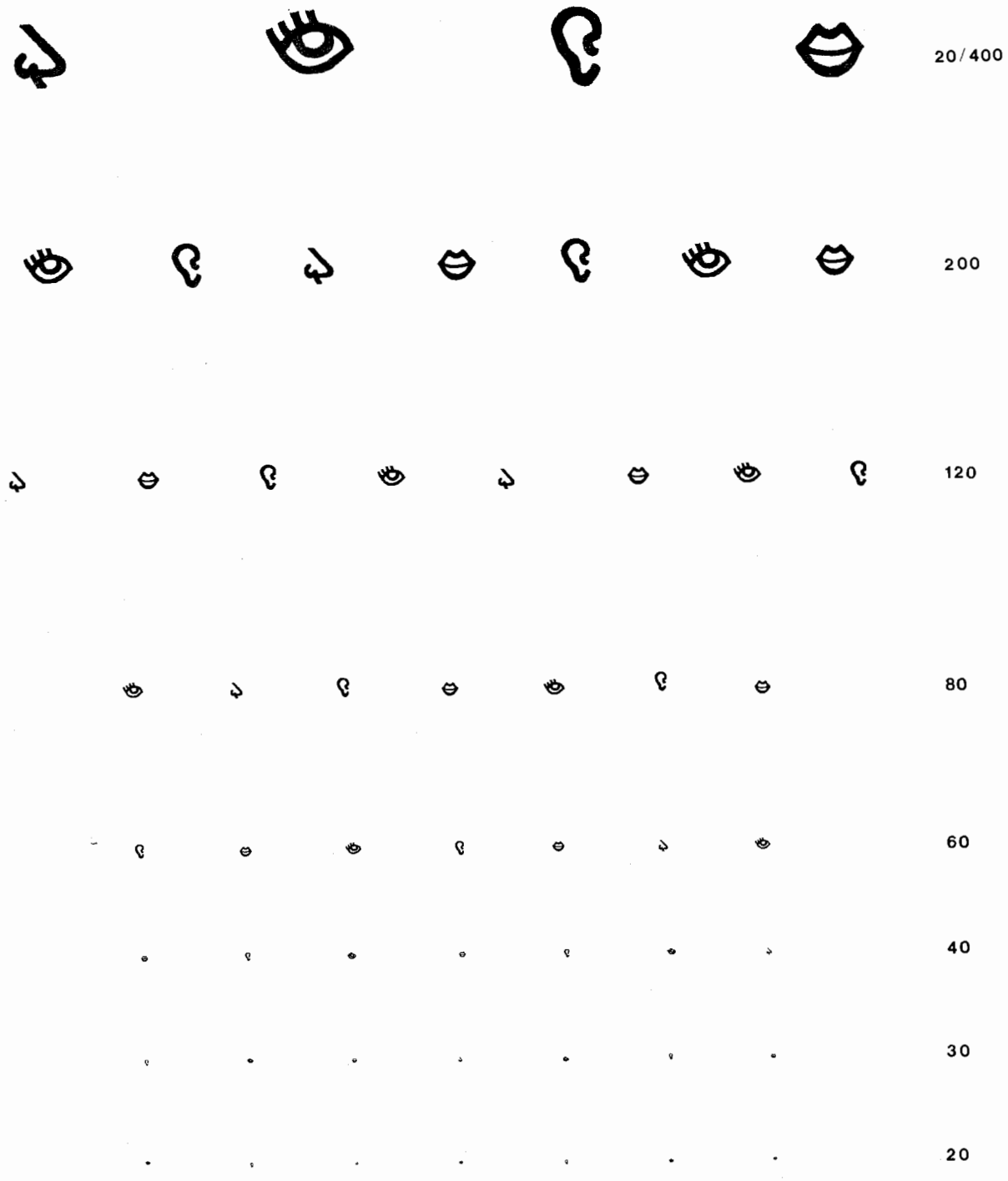
TEST CONSTRUCTION

Acuities to be tested by this new chart, (at near) range from 20/400 to 20/20. The card size used is larger than most other near point testing cards, ( 40 cm. x 30 cm.) and was chosen to obtain more spacing between symbols. This is intended to prevent line interaction, similar to the technique of presenting single optotypes. Many investigators believe testing these young children is most successful with single symbols. Single presentation is considered by many screening personel to be essential in the testing of children under 5 years of age. [8,10,34,42,43,44] Prevention of line interaction was also the reason for increased distance between lines. Width between lines ranges from 4 cm. to 2.5 cm.

The optotypes of this Face Part Chart were designed to be recognizable to children from 18 months to 4 years of age, and to be closely equivalent to Snellen acuity. Snellen letter details subtend 1' of arc. Exact Snellen letter size and exact Snellen detail size produced a symbol that was more line than space and was of such an odd shape (such as square lips) that they were not recognizable. The best solution determined was to to keep consistent Snellen detail size and height, but to increase symbol horizontal width to obtain best recognizability.

The optotypes used were drafted orginally by the author, and then reduced by photographic process to the smaller symbol sizes.

A reduced reproduction of the chart is shown on page 13[4].



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RESEARCH RISKS AND DISCLOSURE

Presented to

Pacific University Institutional Review Board

I. Project Title: FACE PART VISUAL ACUITY CHART

II. Abstract: The Face Part Chart is a new visual acuity chart designed for children from one to four years of age. By using familiar facial features as test characters, difficulties for this young age group, such as letter recognition or verbalization will be reduced or eliminated. Recognition of symbols on the face part chart will be compared to recognition of symbols on two other charts.

III. Location: Tests will be conducted in the child's home.

IV. Project overview: This project is intended as a pilot project to determine the effectiveness of a new visual acuity chart designed for children from one to four years of age. In the past, this age group has presented a challenge to those doing visual acuity testing because of their inability to verbalize a response; difficulty in indicating directions, as for Tumbling "E" charts; or their lack of knowledge of letter names. At the same time, this group is vulnerable to several serious vision defects which are usually detected by visual acuity testing.

This new Face Part Chart is designed to eliminate the difficulties listed above by using, as symbols, pictures of facial parts. These include an eye, ear, nose and mouth. These will be familiar to children of all ages, ethnic backgrounds, social and academic levels, language types, as well as children with physical handicaps. By allowing a response of pointing to their own features, even verbalization will not be needed.

Two standard visual acuity charts will be shown to the child, one at a time and the child will be asked to identify the symbols as small as he or she is able. The ease of recognition of the symbols and efficiency of test administration will be compared.

V. Risks involved and techniques to eliminate them: Risks in this project will be minimal. There may be a risk of a very young child biting a piece off the paper chart. To prevent this, the chart will be laminated in plastic. To prevent any of the children from waving the card and producing injury, the parent of other adult will hold the card at a distance of 10" and the child will only look at the card.

VI. Procedures to monitor subjects: Subjects will be monitored at all times by their parent's presence as well as the presence of the adult tester.

VII.

INFORMED CONSENT FORM

1. Institution
   A. Title of project: Face Part Visual Acuity Chart
   B. Principle Investigator: Chris Gross 649-0138
   C. Advisor: Dr. Paul Kohl 359-2208
   D. Location: Pacific University College of Optometry
      Forest Grove, Or.
   E. Date: April 21, 1987

2. Description of project:
The Face Part Chart is a new visual acuity chart designed for children from one to four years of age. By using familiar facial features as test symbols, difficulties for this young age group, such as letter recognition or verbalization will be reduced or eliminated. Recognition of symbols on the Face Part Chart will be compared to recognition of symbols on two other charts.

3. Description of risks: Risks to the subject will be minimal. The subjects will look at a white piece of paper, and asked to respond by identifing a symbol printed in black ink. There will be no other equipment or contact with the subject.

4. Description of benefits:
This study will serve to increase knowledge of determination of visual acuity in children from one to four years of age.

5. Compensation and medical care:
If you are injured in this experiment it is possible that you will not receive compensation or medical care from Pacific University, the experimenters, of any organization associated with the experiment. All reasonable care will be used to prevent injury.

6. Alternatives advantageous to subjects:
Not applicable.

7. Offer to answer any inquires:
The experimenter will be happy to answer any questions that you may have at any time during the course of this study. If you are not satisfied with the answers you receive, please call Dr. James Peterson at 357-0442.

8. Freedom to withdraw:
You are free to withdraw your consent and to discontinue participation in this project of activity at any time without prejudice to you.

I have read and understand the preceding. I am 18 years of age or over (or this form is signed for me by parent or guardian.)

Printed name _____

Signed _____ Date _____

Address _____ Phone _____

City _____ State/Zip _____

Name and address of a person not living with you who will always know your address. _____

_____

VIII. No other pertinent information regarding risks.

IX. Signed:_____

Advisor:_____

X. Date:_____

Project dates: October 1986-May 1987.